


PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P 02 155 WO		FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/DK2004/000009		International filing date (day/month/year) 08.01.2004	Priority date (day/month/year) 10.01.2003	
International Patent Classification (IPC) or national classification and IPC B29C47/62, A23G9/16				
Applicant TETRA LAVAL HOLDING & FINANCE S.A.				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 9 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand 02.11.2004		Date of completion of this report 18. 04. 2005		
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer Jensen, K Telephone No. +31 70 340-3433		

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

JC20 Rec'd PCT/PTO 11 JUL 2005
International Application No.
PCT/DK2004/000009

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-12 as originally filed

Claims, Numbers

1-15 filed with telefax on 02.11.2004

Drawings, Sheets

1/4-4/4 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
 4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/DK2004/000009

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	6-10,12-15
	No: Claims	1-5,11
Inventive step (IS)	Yes: Claims	
	No: Claims	1-15
Industrial applicability (IA)	Yes: Claims	1-15
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The amendments filed on 02-11-2004 introduce subject matter into claim 1 for which as such no international search report has been established. Consequently the examining instance cannot come to formal statements regarding the disclosure of the introduced subject-matter in relation to the prior art, thus the amendments filed does not meet the requirements following from Article 34(4) PCT, and Rule 66.2(a)(vi) PCT.
 - 1.1 This has as consequence that an evaluation of the presence of an inventive step in claim 1 is not possible on the basis of the ISR. The following statements relates to the originally filed set of claims.
2. Reference is made to the following documents:

D1: US-A-3 518 721
D2: US-A-3 989 941
D3: WO-A-00 72697
D4: WO-A-97 26800
D5: DE-B-10 18 438
D6: US-A-4 045 401
3. Under reference to paragraph VIII of this written opinion, the following comments are made in respect of Article 33(1) to 33(3) PCT herein below. Unclear passages are underlined.
 - 3.1 The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses (the references in parentheses applying to this document) a conveyor screw (3) having a plurality of screw flights (9,10) each extending in a helical path about a longitudinal axis, at least two screw flights (9,10) extend from an inlet end part of the conveyor screw, wherein the outer edges of the two screw flights (9,10) extend in different radial distance from the longitudinal axis, cf. col. 3, lines 55 - 65 and figures 1,2,4.

The subject-matter of claim 1 therefore lacks novelty, and claim 1 does not meet the requirements of Article 33(2) PCT.

- 3.2 Notwithstanding the unclarity mentioned under paragraph VIII of this written opinion independent claim 15 is considered in respect of Article 33(2) and (3) herein below for the benefit of the procedure.

Document D3 is regarded as being the closest prior art to the subject-matter of claim 15, and discloses (the references in parentheses applying to this document) a method of making ice cream mass, wherein the ice cream mass is cooled down to a temperature below 0°C, such as from -1°C to -10°C, where after it is fed into the inlet of a cooled screw conveyor apparatus, cf. document D3, page 6, lines 15 - 27.

From this the subject-matter of claim 15 differs in that the method uses a screw conveyor having multiple screw flights with different heights, according to claim 1.

Therefore the subject-matter of claim 15 is novel, and claim 15 meets the requirements of Article 33(2) PCT.

The underlying technical problem appears to be the reduction of conveyance power, cf. page 3, lines 7 - 9.

However the feature of having screw flights of different heights is already described in document D1, cf. par. 2.1. Since D1 further addresses and solves the objective underlying problem, cf. column 3, lines 23 and 24, the skilled person would regard it as a normal design option to include the feature known from D1 in the ice cream manufacturing apparatus described in document D3 in order to solve the problem posed.

Therefore the subject-matter of claim 15 cannot be considered as involving an inventive step and so claim 15 does not meet the requirements of Article 33(3) PCT.

4. Dependent claims 2 - 14 do not seem to contain any features which, in combination with the features of any claim to which they refer, meet the

requirements of the PCT in respect of novelty or inventive step.

- 4.1 Having the flights extending from the same longitudinal position and having the lower flights extending for a part of the total screw length, cf. claims 2 and 3 is known from document D1, cf. figure 1 and 4.
- 4.2 At least two of the lower screw flights extend for different longitudinal distances and wherein the difference is from 8% - 50%, cf. claims 4 and 5, is known from document D2, cf. figure 2.
- 4.3 A conveyor screw with a flight pitch of 0.9 - 1.4 and with a reducing pitch along the longitudinal direction of the screw, cf. claims 6 and 7, is known from document D4, cf. page 7, lines 19 - 22 and claim 5.
- 4.4 Interruption of the screw flight, cf. claim 9 and 10 is known from document D5 and D6, cf. D5, figure 3 and D6, figure 5
- 4.5 A conveyor with a cylinder or barrel with a conveyor screw therein, cf. claim 11 is known from any of documents D1 through D6.
- 4.6 An ice cream making apparatus, cf. claim 12 - 14, is known from document D3 and D4, cf. D3, page 7, lines 3 - 26 and page 8, D4, page 5, lines 24 - 31 and figure 1.
5. Claims 1 - 15 seem to fulfill the requirements of Article 33(4) PCT, with regard to industrial applicability.

Re Item VII

Certain defects in the international application

1. Independent claims 1 and 15 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(I) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

2. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 - D3 is not mentioned in the description, nor are these documents identified therein.

Re Item VIII

Certain observations on the international application

1. In respect of Article 6 PCT, the following is observed.
 - 1.1 Independently drafted claim 12 comprises all the features of claim 1 and is therefore dependent on the latter, cf. Rule 6.4 PCT.
 - 1.2 Since independent claim 1 does not contain the apparatus features referred to in claim 15, the independent claims do not meet the requirement following from Article 6 PCT, taken in combination with Rule 6.3(b) PCT, that any independent claim must contain all the technical features essential for defining the area for which protection is sought.

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AMENDED SET OF PATENT CLAIMS FILED ON 2 NOVEMBER 2004

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- 5 1. A conveyor screw (8) having a plurality of screw flights (13-20) each extending in a helical path about a longitudinal axis, at least two screw flights (13-16) extend from an inlet end part of the conveyor screw, wherein the outer edges of the two screw flights (13-16) extend in different radial distance from the longitudinal axis, and the radially shorter screw flights extend in the range of 0.85 to 0.98 times the radius of the longer screw flight.
- 10 2. A conveyor screw according to claim 1, wherein at least one screw flight (14-16) extending at a lower radial distance from the longitudinal axis, extends from the inlet end part from substantially the same longitudinal position of the conveyor screw as the screw flight (13) extending at a higher radial distance from the longitudinal axis.
- 15 3. A conveyor screw according to claim 1 or 2, wherein one or more screw flights (14-16) extending at a lower radial distance from the longitudinal axis, extends from the inlet end part and along the conveyor screw for between 5% and 65%, preferably between 7% and 50% of the total length thereof.
- 20 4. A conveyor screw according to any of the claims 1-3, wherein at least two screw flights (14-16) extending at a lower radial distance from the longitudinal axis, extend from the inlet end part and for different longitudinal distances from the inlet end part.
- 25 5. A conveyor screw according to claim 4, wherein the difference in the extension from the inlet end part of said screw flights (14-16) amounts to from 8% to 50%, preferably from 12% to 40% of the total length of the conveyor screw.

6. A conveyor screw according to any of the preceding claims, wherein the pitch of the screw flights (13-16) at the inlet end of the conveyor screw is 0.9 to 1.4, preferably 1.1-1.3.

5 7. A conveyor screw according to any of the preceding claims, wherein the pitch of the screw flights (17-20) is reduced along the longitudinal direction of the conveyor screw to 0.7 to 1, preferably 0.8 to 0.9 at an outlet end of the conveyor screw.

10 8. A conveyor screw according to any of the preceding claims, wherein everywhere along the longitudinal direction of the conveyor screw, at least one screw flight (13, 17-20) extends to a given highest radius, so that the complete inner wall of a cylindrical cavity in which the conveyor screw is placed, is scraped by rotation of the conveyor screw.

15 9. A conveyor screw according to any of the preceding claims, wherein the screw flights (13, 17-20) extending to highest radial distance from the longitudinal axis progress discontinuously in the longitudinal direction, so that a peripherally extending opening exists between these screw flights (13, 17-20) at least at one position along the longitudinal direction.

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10. A conveyor screw according to claim 9, wherein said opening or openings extend over 120 to 240° of the periphery, preferably over 150 to 210° of the periphery.

25 11. A conveyor comprising a stationary part having an inner surface, which closely encloses a conveyor screw (8) according to any of the claims 1-10, drive means (W) for driving a rotation of the conveyor screw (8) about the longitudinal axis thereof, and inlet (6) and outlet (9) to direct a mass to the inlet end (10) of the conveyor screw (7) and from its outlet end, respectively.

12. An apparatus for making ice cream, comprising a through-flow freezer (7) having an inner surface, which closely encloses a conveyor screw (8) according to any of the claims 1-10, drive means (W) for driving a rotation of the conveyor screw (8) about the longitudinal axis thereof, cooling means for cooling the inner surface, and inlet (6) and outlet (9) to direct an ice cream mass to the inlet end (10) of the conveyor screw (7) and from its outlet end, respectively.

13. An apparatus according to claim 12, wherein the cooling means are adapted to cool down a through-flowing ice cream mass, which enters with a temperature from -1°C to -10°C, with from 4 to 25°C.

14. An apparatus according to claim 12 or 13, wherein the drive means (W) is adapted to drive the conveyor screw (8) with from 10 to 50 rotations per minute, preferably with from 20 to 35 rotations per minute.

15. Method of making an ice cream mass, wherein the ice cream mass is cooled down to a temperature below 0°C, such as from -1°C to -10°C, where after it is fed into the inlet (6) of an apparatus according to any of the claims 12-14.